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Gamble; the Mastigophora by A. Willey and S. J. Hickson; the Hæmoflagellates by H. M. Woodcock, while descriptions of Chlamydomyxa and Labyrinthula written by J. J. Lister, form an appendix.

There is little to be said on the whole in regard to the descriptions of the majority of the articles. The section on Hæmoflagellates contains many important facts regarding hosts and parasites, otherwise it differs little from Woodcock's original article in the *Q. J. M. S.*, 1906. It is remarkable, however, that Spirochaeta and Treponema are not mentioned in the account of the Mastigophora and that these most widely studied of all protozoan parasites should be passed by with only a short statement in an appendix to the Hæmoflagellates. All of the articles are fairly clear and well-written expositions of the structures and modes of life of the several types of Protozoa, but with the exception of the sections on Mycetozoa and Radiolaria there is little that is new or above the average of an ordinary text-book, while there are few references to literature later than 1906. With the Mycetozoa and the Radiolaria, however, there is no savor of mediocrity. Here the descriptions of structures and life histories are written with reference to the problems in general biology with which the protozoa have the most to do, and with a philosophical breadth of view as refreshing as it is novel.

While the book makes no pretense of arranging the various groups of Protozoa in any way that might be construed as showing phylogenetic relationships of the unicellular animals, it does seem peculiar and unnecessary to separate Heliozoa completely from Radiolaria and insert a section on Mycetozoa between them. As long as the organs of locomotion of Protozoa are accepted as indicating the natural limits of a group, consistency at least should be exercised to keep the undoubted close relations of these two groups before the eyes of the student. There is some danger, too, of the latter becoming so tangled up in a maze of unfamiliar terms that he might well wish to get away from the subject as soon as possible and leave the Protozoa

to pedants. He finds that "koniokaryote" protoplasm superseded the condition of "plasson"; that the well-known and well-understood term "cytoplasm" must be replaced by the unfamiliar word "periplasm," and his brain whirls with the confusion of "gubernaculum," "tractellum," "pulsellum," while his ideas of the fixity of biological conceptions get sadly twisted in trying to discover why nature ever made the mistake of allowing a "tractellum" to act as a "pulsellum," or a zoologist to go backwards twenty-five years and classify *Volvox* as a protozoon!

As with all the volumes of this treatise the type, page and illustrations are excellent, the latter being well drawn, clearly reproduced, and many of them unusual as text-book figures. The paper is altogether too thick and clumsy however, making a heavy and poorly bound volume, which will never stand the wear of ordinary use.

G. N. C.

#### SCIENTIFIC JOURNALS AND ARTICLES

*The Journal of Biological Chemistry*, VI., No. 6, issued November 12, 1909, contains the following: "The Purines and Purine Metabolism of the Human Fetus and Placenta," by H. Gideon Wells and Harry J. Corper. A study showing the independent development of the various purine enzymes during the growth of the fetus and indicating active metabolism in the placenta. "Soluble Chitin from *Limulus polyphemus* and its Peculiar Osmotic Behavior," by C. L. Alsberg and C. A. Hedblom. Prolonged treatment of *Limulus* chitin with HCl produces soluble chitin which has the peculiar power of dialyzing and of carrying the water in which it is dissolved through the membrane. "Some Observations on the Study of the Intestinal Bacteria," by A. I. Kendall. An outline of general procedures applicable to the determination of the more important types of bacterial activity in the intestinal tract. "A Study of the Chemistry of Bacterial Cellular Proteins," by Sybil May Wheeler. A comprehensive study of bacterial proteins from various sources, their properties, the nature and amounts of their cleavage products together with accounts of efforts to

isolate and identify the toxic elements in them.

### SPECIAL ARTICLES

#### THE GEOLOGICAL AND GEOGRAPHICAL DISTRIBUTION OF SOME PLEISTOCENE MAMMALS

SOME months ago Professor Henry F. Osborn, of the American Museum of Natural History, published<sup>1</sup> an important paper entitled "Cenozoic Mammal Horizons of Western North America." Having had occasion recently to consider some phases of the Pleistocene I have examined with interest the part of Professor Osborn's paper devoted to this period.

Professor Osborn has been giving attention to Tertiary history and correlation for many years. In 1900<sup>2</sup> he published his "Correlation between Tertiary Mammal Horizons of Europe and America," in which he devoted eleven pages to a consideration of the Pleistocene. In connection with this he issued a "Third Trial Sheet," in the preparation of which he had the assistance of several European geologists and paleontologists. The paper and the trial sheet dealt more especially with European history. The paper of 1909, put forth after nine years' further investigation on the part of Professor Osborn, during which time numerous other paleontologists and geologists had occupied themselves with Pleistocene studies, presents more fully the American side of the problems.

In Professor Osborn's treatise of 1900 he and his collaborators recognized fully the work that had been done by geologists in their determination of the existence, in Europe, of more than one sheet of glacial accumulations and one or more interglacial deposits. In the communication of 1909, on the contrary, Professor Osborn makes no mention of the great advances that have been made within recent years in the knowledge of the Glacial epoch in North America, resulting in the discovery of four or five distinct glacial sheets and a corresponding number of interglacial deposits of soils, peat beds, gravels and sands, with their organic contents. His bibliography of

the Pleistocene (pp. 17, 18) contains no references to such authors as Bain, Calvin, Chamberlin, Dawson, Leverett, Lewis, Salisbury, Tyrrell and others whose works have been of the highest value in the solution of many problems connected with Pleistocene history. And it may be affirmed with confidence that without giving due consideration to glacial geology no correct solution of the paleontology of the Pleistocene is possible.

It appears to have been Professor Osborn's intention to divide the Pleistocene into the Lower, or Preglacial; the Middle, or Glacial, and the Upper, or Postglacial; although he does not mention the last division. We need not here discuss the propriety of recognizing a preglacial stage of a period that has little or nothing to distinguish it from the Pliocene, except the presence of glaciers. On page 87 of Bulletin 361 is a table showing the approximate times of appearance and disappearance of certain important genera of mammals. It is an unfavorable comment on our knowledge of the Pleistocene, when all that can be said of six important genera is that they disappeared at some time during the Glacial period. It is my belief that the history of some of the interesting animals concerned can be determined somewhat more accurately. A beginning will be made with *Equus*, the horses, a genus which Osborn says disappeared from North America during the "upper mid-Pleistocene," a time which unfortunately he does not limit either downward or upward.

If now we indicate on a map all of the apparently authentic finds of fossil horses in the United States east of the great plains, we learn that, starting in New Jersey, one series of localities arranges itself along the Atlantic and the Gulf coasts, while the other, with a few important exceptions, follows an irregular line through Pennsylvania, Ohio, Indiana, Kentucky, Illinois, Missouri, Iowa and South Dakota. A comparison with a map showing the glaciated region of the country indicates that the localities of the last series (barring the few exceptions) are situated close to the southern border of the drift-covered area.

The earliest discovery of fossil horse re-

<sup>1</sup> Bull. U. S. Geol. Surv., 361, pp. 1-90.

<sup>2</sup> Ann. N. Y. Acad. Sci., XIII., pp. 1-64.